OH-293-12

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REPORT OF SUBSOIL AND GROUNDWATER INVESTIGATION REPORT CHEMICAL RECOVERY SYSTEMS PROPERTY LOCUST STREET ELYRIA, OHIO

F O R

Mr. Art Longano

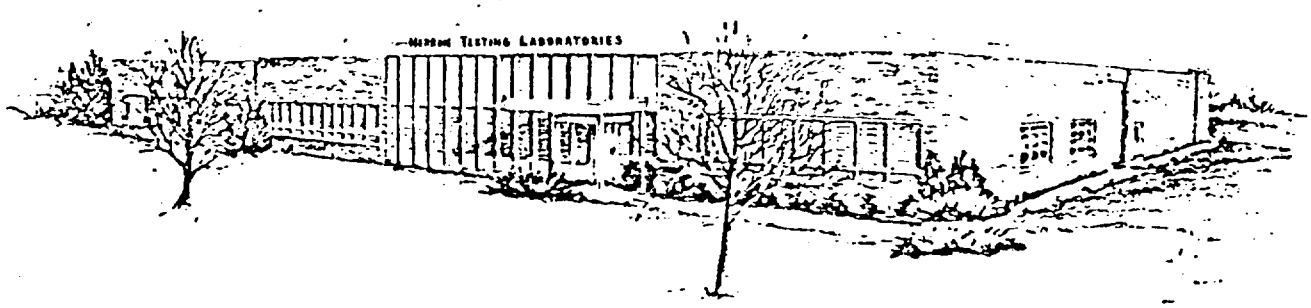
The Harshaw Chemical Company

Elyria, Ohio

HTL, Inc. Project No: L-8011

Investigation Period: March - April, 1979

Report Submittal Date: 27 April 1979



HERRON TESTING LABORATORIES, INC.

HERRON TESTING LABORATORIES, INC.
5405 SCHAAF ROAD • CLEVELAND, OHIO 44131 • 216/524-1450
CONSULTATION AND TESTING SINCE 1911

27 April 1979

Mr. Art Longano
The Harshaw Chemical Company
113 John Street
Elyria, Ohio 44035

SUBJECT: SUBSOIL AND GROUNDWATER INVESTIGATION REPORT
CHEMICAL RECOVERY SYSTEMS PROPERTY
LOCUST STREET
ELYRIA, OHIO

HTL, Inc. Project No: L-8011

At your request we have completed a subsurface investigation within the subject site.

The purpose of the investigation was to determine subsoil stratification, physical and structural properties and groundwater conditions underlying the site. It was also intended to investigate the presence of certain contaminants in the subsoils and/or groundwater which may have resulted from past or present operations involving the handling and processing of chemical waste materials. Based on subsurface conditions encountered certain recommendations are included as to the feasibility of site for new building construction. Conditions encountered which would be expected to influence the design and construction of the new facilities are also discussed.

The investigation was based on subsurface exploration and sample acquisition operations conducted at a series of five (5) test locations, laboratory evaluation of samples, visual site examination and boundary survey information supplied by the Harshaw Chemical Company.

The selection and field location of test borings was carried out jointly by The Harshaw Chemical Company and Herron Testing Laboratories, Inc.

Throughout this investigation it has been assumed that subsurface conditions do not vary between test boring locations and between sampling intervals.

A. FIELD INVESTIGATION PROCEDURE

Five (5) test borings were drilled within Chemical Recovery Systems property at approximate locations as indicated on the accompanying Plot Plan in Appendix I. The test borings were drilled utilizing truck mounted rotary drive drilling equipment and either 4" solid stem or 7" o.d. and 2.75" i.d. hollow stem flight augers or NX size diamond rock core barrels. The depths of explorations ranged between approximately 5.7' and 24.5' with respect to existing site grades. At regular intervals, representative samples of the existing subsoil materials were taken by means of a two-inch o.d. split spoon sampling device driven by a 140 lb. hammer free falling through a distance of thirty (30) inches. The number of hammer blows required to achieve eighteen (18) inches of sample spoon penetration was noted and recorded in individual six (6) inch increments. The hammer blows required to drive the sampling spoon for each six (6) inch penetration interval are entered under blow count on the accompanying test boring logs. The sum of the blow counts associated with the second and third (6) inch penetration intervals represents the standard penetration resistance (N). Split spoon sampling operations were carried out in accordance with the American Society for Testing and Materials' standard method D-1586.

In hard formations where less than 6" penetrations were achieved, the penetration resistances for fractions of a foot were noted and recorded.

The samples of materials retained by split spoon sampling operations were visually classified in the field and placed in properly identified sealed glass sample jars for return to the laboratory.

At the approximate refusal plane of soil drilling equipment in test borings B-3 and B-4 diamond core drilling procedures were carried out utilizing approximate 10' length runs. Subsequent to each individual run the diamond core barrel was removed and the percentage of core recovery was determined.

At the completion of test holes B-3, B-4 and B-5 perforated plastic tubing was installed to prevent the test boring from caving and to permit groundwater sampling and monitoring. The observation wells were sealed with concrete at ground surface and were capped. The sample materials obtained from the test boring and coring operations as described above were delivered to our laboratory for evaluation.

In approximately 3 days following the observations well installations in Borings B-3, B-4 and B-5 groundwater samples were obtained from these test holes and returned to our chemical laboratories for analysis.

B. LABORATORY TEST PROCEDURES

All soil sample materials obtained from the test borings were classified in accordance with ASTM test procedure D-2488 titled "Description of Soils, Visual-Manual Procedures."

The rock core samples were also visually classified in the laboratory and were identified by geologic age. In addition to classification, core recovery characteristics, longest intact core samples and the rock quality designations are noted for each individual core drilling runs in the boring log plates following the boring location plan in Appendix I.

Sample materials which exhibited chemical odors during laboratory classifications are noted in the individual boring logs.

Soil samples exhibiting strong chemical odors and all three water samples obtained in the test borings were subjected to chemical analysis. The scope of chemical testing was jointly decided between the Harshaw Chemical Company and Herron Testing Laboratories, Inc. The type of tests conducted included pH determinations and dissolved substance and organic matter determinations. In addition, the presence of combustible gases were investigated in certain soil samples.

The results of laboratory analysis together with a chemical report by Dr. Douglas Allenson, Herron Testing Laboratories, Inc. Chief Chemist are included as Appendix II in the present report.

C. SITE CONDITIONS

The investigated site involves an approximate 2 acre plot currently occupied by Chemical Recovery Systems, Inc. on the west side of Locust Street in the city of Elyria, Ohio. The site is bounded by existing plant facilities of The Harshaw Chemical Company from the north and east and by the Black River from the west. From a topograhical standpoint the site is regular, except for river bank sectors. It appears that river bank sectors had been subjected to man made fill superimpositions.

The site currently is occupied by certain abandoned residential frame structures, certain single story, primarily masonry structures housing process equipment and extensive open storage areas primarily for drums filled with chemicals.

Subsurface conditions encountered in the test borings are described in detail in the Boring Log Plates in Appendix I.

Subsurface conditions encountered can be summarized as follows:

(1) The site at all test positions is overlain by heterogeneous man made fill materials, which extends to depths ranging between approximately 1.5' and 12' below existing site grades. Generally increasing fill depths are indicated in the east to west direction across the site with maximum fill depths existing at and in the vicinity to the river bank.

The fill includes a variety of materials including silty clays, sands, cinders, slag, rock fragments, wood, masonry, etc.

(2) Underlying the fill, loose brown fine silty sands were encountered in Borings B-1, B-2, B-4 and B-5. The granular formations extend to between 3' and 4.5' below top of borings B-1 and B-2 and to between 10' and 15' below top of borings B-4 and B-5.

(3) Inferior to the silty sands in Borings B-1, B-2 and B-5 and to the fill in Boring B-3 brown or gray silty clays with variable fractions of sand and rock fragments were encountered. These formations terminate between 5' and 6' below existing site grades at borings B-1 through B-3 and at 18' in boring B-5 near the river bank. Inferior to the silty clays in boring B-5 brown to black sands with sandstone fragments were encountered to 23' below the top of boring. The consistencies of silty clays varied between soft and very stiff.

(4) Underlying the site at all test positions weathered sandstone was evidenced at between 5' and 6' below existing site grades in borings B-1, B-2 and B-3. Sandstone was also encountered in Borings B-4 and B-5, near the river bank, at between 10' and 18' below existing site grades. The weathered sandstone terminates at an unspecified zone of demarcation into sound sandstone. The sound sandstone encountered in borings B-3 and B-4 can be classified as the Berea Sandstone, Mississipian System.

(5) Free water was encountered in all test borings generally at or near top of sandstone encounter elevations.

D. PROPOSED CONSTRUCTION

The area of investigation is being considered as a potential site for the expansion of existing plant facilities of The Harshaw Chemical Company.

Specific details of the proposed facilities are unavailable.

E. CONCLUSIONS AND RECOMMENDATIONS

Based on the present investigation as described above, the following conclusions and recommendations are offered relative to the feasibility of proposed site development.

(1) The upperlying soils consist of man made fill whose terminal depth ranges between approximately 1.5' and 12'. Generally substantial fill deposits should be anticipated west-northwest site sectors, in vicinity to the riverbank which had been subject to dumped fill placement.

Only a thin layer of overburden was encountered in Borings B-1 through B-3. These soils consisted of either fill, loose granular soils or silty clays. This condition would be expected to be typical for most of the site except at near river bank sectors.

Based on results of Borings B-1, B-2 and B-3 it appears that sandstone would be encountered in most site sectors at depths ranging between approximately 5' and 6' below existing site grades. Near the river bank precipitous slope variations both in fill or soils slopes as well as sandstone encounter plane elevations exist. The specific locations of the top of rock slopes has not been established during this investigation. The location of the top of rock slopes will require verification during a future supplemental investigation.

(2) Available data indicate that it would not be feasible to support any significant structures within the overburden soils. With current soil conditions excessive settlements are likely to occur. In connection with structures to be located near existing slope sectors, in addition to settlements, slope stability problems as well would exist.

It may be feasible to support lightly loaded small structures in the overburden soils excluding any and all fill provided that such structures would bear away from slope sectors and either in undisturbed sands or silty clays. The feasibility of employment of a shallow foundation

system bearing within the overburden soils would have to be verified during a supplemental site investigation conducted at specific structures locations.

(3) Based on the present feasibility investigation, the following alternatives appear to exist relative to economical and structurally feasible foundation systems for proposed major building structures:

(a) Normal spread footer foundation system bearing within the weathered sandstone. This system appears applicable in all site sectors except at and in the vicinity to top of existing slope sectors. Minimum of full footer pad inclusions in sandstone are recommended. Preliminary design may be based on 5 tons per footsquare maximum allowable rock loadings in the weathered sandstone.

(b) Drilled straight shaft caisson members bearing within the underlying sound sandstone. Sound sandstone encounter should be expected between approximately 2' to 3' below initial encounter of sandstone. A minimum 12" penetration into the sound sandstone should be specified. Casings could well be required for excavation supports. Preliminary caisson design may be based on 20 tons per footsquare maximum allowable loading on end bearing. Higher allowable rock loadings are possible with deeper caisson penetrations into the sandstone.

Fill slopes adjacent to the river are unstable, and the underlying rock slopes are uncertain. Without a detailed investigation of subsurface conditions underlying existing river bank slopes, the utilization of this area for structural support is not recommended.

(4) In order to achieve satisfactory support of floor slabs and pavements within the overburden soil, partial excavation of the upperlying heterogeneous fill materials and their replacement with a carefully compacted structural fill could well be required.

Existing structures foundations will require removal in their entirety under proposed foundation members. Under proposed floor slabs and pavement existing foundations should be removed to proposed finish grades - 24".

There was no evidence of the existence of buried chemical or other wastes underlying the site. Chemical contamination of soil and groundwater appeared to originate from spillage.

Concerning the presence of combustible gases and potential effect of chemicals on underground piping, cables, concrete construction, etc., we would like to refer to the accompanying Chemical report in Appendix II.

We appreciate the opportunity of discussing this project. If we can be of further assistance, please do not hesitate to call.

HERRON TESTING LABORATORIES, INC.

Ervin Hegedus, P. E.
Principal Engineer

EH/lk

Original + 2cc: The Harshaw Chemical Company

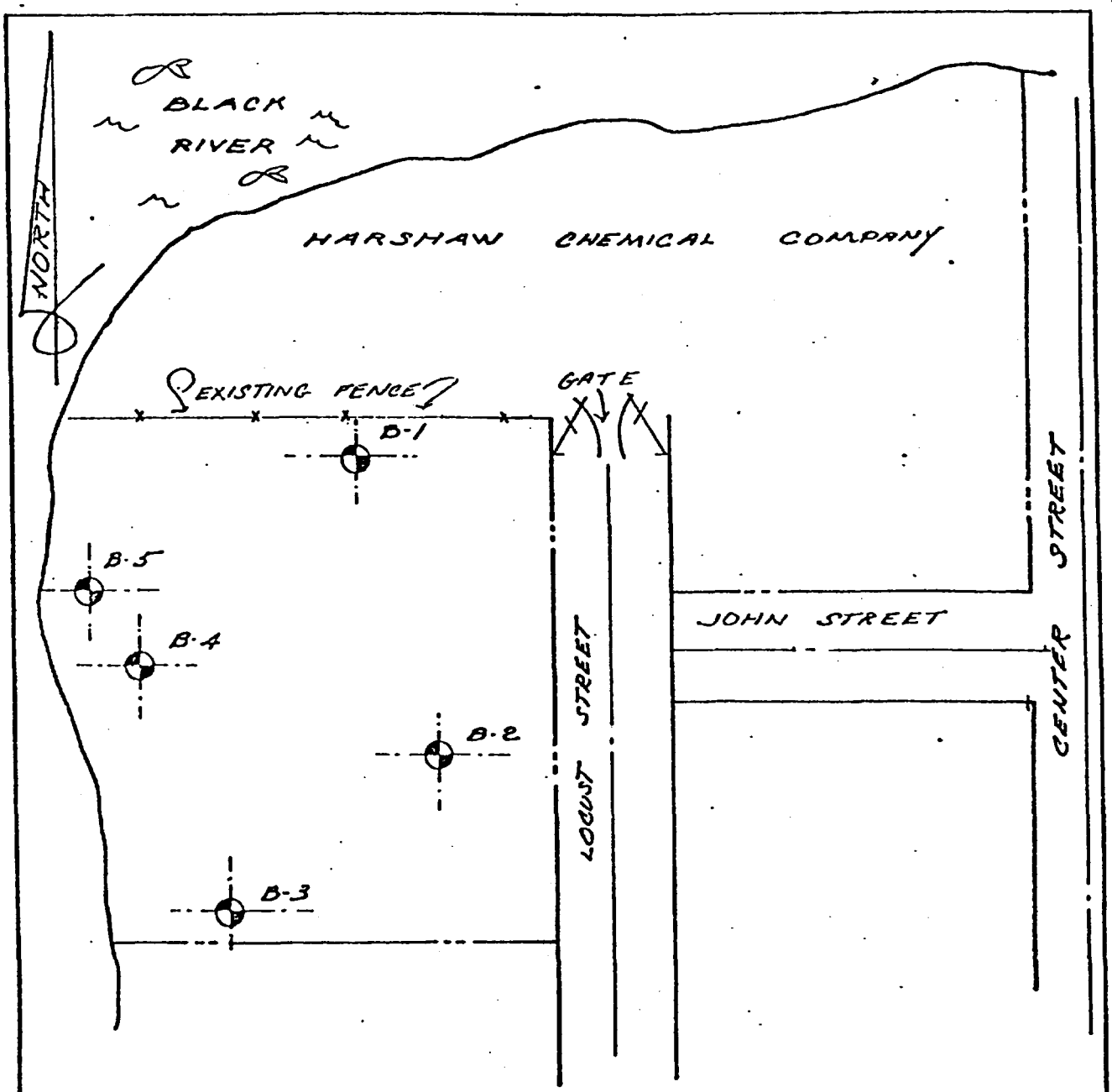
A P P E N D I X I

Boring Location Plan

Boring Logs

General Notes

Soil Classification Chart



BORING LOCATION PLAN

FOR: THE HARSHAW CHEMICAL COMPANY
AT: EXISTING IN-USE PLANT FACILITY
CHEMICAL RECOVERY SYSTEMS, INC.
LOCUST STREET
ELYRIA, OHIO

REVISIONS		CHECKED	SCALE	PROJECT NUMBER
DATE	REMARK		1" = 100'±	L-8011
			DRAWN	
		APPROVED		DRAWING NUMBER
			DATE 4-9-79	SD. 5/6

HERRON TESTING LABORATORIES, INC.
Consultation and Testing
5405 EAST SCHAAF ROAD · CLEVELAND, OHIO 44131

TEST BORING LOG

SUBSURFACE AND GROUNDWATER INVESTIGATION

TEST HOLE: B-1

FILE NO.: L-8011

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY

ELEV. DATUM: _____ DRILLED: 5 MARCH 1979 BY J. MINARCHICK

ELEV. (FT.)	DEPTH	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	6-5-4	Black Cinders, Silt, Sand, Slag and Coal. Fill. Moist.
			2	SS	3-5-9	Brown FINE SAND. Some Sandstone Fragments. Trace Silt. Medium. Moist. (SP)
			3	SS	4-3-3	Brown SILTY CLAY. Some Sand to Sandy, with Some Sandstone Fragments. Medium to Stiff. Moist. (CL)
	5		4	SS	4-7-31	
			5	SS	50/5"	Sandstone.
	10					

GROUND WATER ENCOUNTER: 4.5'

AT COMPLETION: _____

AFTER _____ AT _____

AFTER _____ AT _____

SEE GENERAL NOTES FOR ABBREVIATION AND NOMENCLATURE

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TEST BORING LOG

SUBSURFACE AND GROUNDWATER INVESTIGATION

TEST HOLE: B-2

FILE NO.: L-8011

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY

ELEV. DATUM: _____ DRILLED: 5 MARCH 1979 BY J. MINARCHICK

ELEV. (FT.)	DEPTH	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	20-9-15	Brown Coarse to Fine Sand and Sandstone Fragments with Trace Slag, Gravel, Clay and Silt.*Fill.Mois
			2	SS	8-5-3	Brown FINE SAND. Some Sandstone Fragments. Trace Silt*. Loose to Medium. Moist. (SP)
			3	SS	20-17-11	
	5		4	SS	9-7	Brown SILTY CLAY. Some Sand and Sandstone Fragmen with Gray Silty Clay Laminae.* Very Stiff. Moist.
			5	SS	50/2"	**
	10					

(*) SAMPLE WITH CHEMICAL ODOR.

(**) Brown Fine Sand and Sandstone Fragments. Moist.

GROUND WATER ENCOUNTER: 5.0'

AT COMPLETION: _____

AFTER _____ AT _____

AFTER _____ AT _____

SEE GENERAL NOTES FOR ABBREVIATION AND NOMENCLATUR

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TEST BORING LOG

TEST HOLE: B-3

SUBSURFACE AND GROUNDWATER INVESTIGATION

FILE NO.: L-8011

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY

ELEV. DATUM: _____ DRILLED: 6 MARCH 1979 BY J. MINARCHICK

ELEV. (FT.)	DEPTH	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	7-7-3	Layers of Brown and Dark Brown SILTY CLAY with Some Sand, Slag, Wood and Mortar Fragments. Fill. Stiff to Very Stiff. Moist. (CL)
			2	SS	3-4-8	
			3	SS	17-7-10	
	5		4	SS	5-40/1"	Brown SILTY CLAY and Brown FINE SAND. Loose. Moist. (CL) and (SP)
						Brown Medium to Fine-Grained Sandstone. Moist.
	10					
	15			NX		Brown Medium to Fine-Grained Sandstone, Well Cemented, Massive. Banding noted throughout sample.
						CORE DATA:
						14.5' - 24.5' RECOVERY: 7.5' (90%)
						LONGEST PIECE: 36"
	20					RQD: 83%
						Berea Sandstone. Mississippian Series. Carboniferous System.
	25					

GROUND WATER ENCOUNTER: _____

AT COMPLETION: 16.7'

AFTER 24 HOURS AT 15.2'

AFTER _____ AT _____

24.5'

SEE GENERAL NOTES FOR ABBREVIATION AND NOMENCLATURE

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TEST BORING LOG

TEST HOLE: B-4

SUBSURFACE AND GROUNDWATER INVESTIGATION

FILE NO.: L-8011

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY

ELEV. DATUM: _____ DRILLED: 5 MARCH 1979 BY J. MINARCHICK

ELEV. (FT.)	DEPTH	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	10-9-5	Dark Brown Silty Clay, Sand, Cinders, Gravel and Slag with Chemical Odor. Fill. Moist.
			2	SS	1-2-3	
			3	SS	2-2-3	Brown FINE SAND. Some Silt, Slag and Sandstone Fragments. Trace Gravel with Chemical Odor. Fill. Loose. Moist. (SP)
	5		4	SS	3-1-4	
			5	SS	2-2-2	Brown SILTY FINE SAND with Sandstone Fragments. Loose. Moist. (SM)
			6	SS	1-1-3	Brown FINE SAND. Trace Silt with Sandstone Fragmen
			7	SS	5-4-52	Loose. Moist. (SP)
	10		8	SS	50/4"	Brown Medium to Fine-Grained Sandstone. Moist.
	15			NX		Brown Medium to Fine-Grained Sandstone, Well Cemented, Massive. Banding noted throughout Sample.
						CORE DATA:
						14.5'-24.5' RECOVERY: 9.8' (98%)
						LONGEST PIECE: 35"
	20					RQD: 69%
						Berea Sandstone. Mississippian Series. Carboniferous System.
	25					

GROUND WATER ENCOUNTER: 9.5'

AT COMPLETION: 15.2'

AFTER 24 HOURS AT 10.1'

AFTER _____ AT _____

TERMINAL DEPTH: 24.5'

SEE GENERAL NOTES FOR ABBREVIATION AND NOMENCLATURE

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Consultation and Testing
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TEST BORING LOG

TEST HOLE B-5

SUBSURFACE AND GROUNDWATER INVESTIGATION

FILE NO.: L-8011

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY

ELEV. DATUM: DRILLED: 7 MARCH 1979 BY J. MINARCHICK

ELEV. (FT.)	DEPTH	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	11-9-8	Dark Brown Silty Clay, Slag, Mortar Fragments, Cinders, Sand and Gravel*. Fill. Moist.
			2	SS	8-12-10	
			3	SS	3-2-5	Brown SILTY FINE SAND. Trace Clay, Slag and Cinde Fill. Loose. Moist. (SM)
	5		4	SS	3-2-2	Black Cinders with Sand and Mortar Fragments.* Fi Moist.
			5	SS	2-2-2	Gray SILTY FINE SAND. Trace Cinders, Slag, Coal, Clay and Mortar Fragments.* Fill. Moist.
			6	SS	2-2-2	
			7	SS	3-2-2	Gray Silty Fine Sand, Slag and Cinders. Trace Coa and Mortar Fragments.* Fill. Moist.
	10		8	SS	1-2-2	Black Silt and Cinders with Sand, Slag, Coal and Mortar Fragments. * Moist.
			9	SS	3-2-2	Brown FINE SAND. Some Silt. Trace Clay. Loose. Moist. (SM)
			10	SS	2-2-2	Black to Gray SILTY FINE SAND.* Loose. Moist. (SM)
	15		11	SS	2-1-2	Gray SILTY CLAY. Some Fine Sand. Trace Wood Fragm
			12	SS	3-1-1	* Soft. Moist. (CL)
			13	SS	2-3-2	Brown and Black Sand and Sandstone Fragments.* Moist to Wet.
	20		14	SS	7-5-6	
			15	SS	4-6-6	
	25					Sandstone.

(*) SAMPLE WITH CHEMICAL ODOR.

GROUND WATER ENCOUNTER: 17.0'

AT COMPLETION: 21.3'

AFTER ____ AT ____

AFTER ____ AT ____

TERMINAL DEPTH: 23.0'

SEE GENERAL NOTES FOR ABBREVIATION AND NOMENCLATUR

HERRON TESTING LABORATORIES, INC
Consultation and Testing
5405 EAST SCHAAF ROAD-CLEVELAND, OHIO 441

GENERAL NOTES FOR TEST BORING LOGS

(All A.S.T.M. Standards are the latest approved unless noted)

ENTERED UNDER SAMPLE TYPE:

CA - Continuous Flight Auger Sample
HA - Hand Auger Sample

Disturbed sample obtained from auger flight in substantial accordance with the requirements of A.S.T.M. method D-1452

SS - Split Barrel Sample (2" O.D., 1.375" I.D.) *

Driven sampler for disturbed sample obtained in substantial accordance with the requirements of A.S.T.M. method D-1586.

ST-2 - Thin-Walled Shelby Tube Sample (2" O.D., 1.875" I.D.)
ST-3 - Thin-Walled Shelby Tube Sample (3" O.D., 2.875" I.D.)
PT - Thin-Walled Piston Tube Sample

Static force pressed sampler for "undisturbed" sample obtained in substantial accordance with the requirements of A.S.T.M. method D-1587

LS - Sectional Liner Sample (Ring Shear)

W - Wash Sample

Obtained from churn-drive boring methods.

DC - Diamond Rock Core Barrel Sample (unspecified size)
NX - 2.125" I.D. Diamond Rock Core Barrel Sample
BX - 1.625" I.D. Diamond Rock Core Barrel Sample
AX - 1.1875" I.D. Diamond Rock Core Barrel Sample

Continuous rock core samples obtained from formations too hard to be sampled by soil sampling methods. Sample obtained in substantial accordance with the requirements of A.S.T.M. tentative method D-2113

(*) Other diameters, when employed, are noted on Boring Log.

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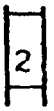
ENTERED UNDER SAMPLE NO.:



- Indicates sample number and acquisition interval.

ENTERED UNDER BLOW COUNT:

EXAMPLE: 6/9/12 - The number of blows of a 140-pound hammer, free falling through a distance of 30 inches, required to drive a standard (2" O.D., 1.375" I.D.) split barrel sampler into the soil, including an initial six-inch seating penetration. Blows recorded in 6-inch increments for a distance of 18 inches in substantial accordance with the requirements of A.S.T.M. method D-1586

EXAMPLE: 60/2" - The number of blows (60) required to drive a standard split barrel sampler for a distance (2") of less than one foot. Recorded in substantial accordance with the requirements of A.S.T.M. method D-1586-67.

SSR - Split barrel sampler penetration refusal at advance of less than one inch for 50 blows.

STR - Thin-walled Shelby-tube sampler refusal. Would not advance with steady static force.

STD - Thin-walled Shelby tube driven.

AR - Auger refusal.

ENTERED UNDER LOG & CLASSIFICATION:

See "Soil Classification Chart".

HERRON TESTING LABORATORIES, INC.
Consultation and Testing
5405 EAST SCHAAF ROAD-CLEVELAND,OHIO 44131

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			GROUP SYMBOL	GRAPHIC SYMBOL	TYPICAL NAME
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS	GW		WELL GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP		POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND	SW		WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SAND WITH FINES	SM		SILTY SANDS, SAND-SILT MIXTURES
			SC		CLAYEY SANDS, SAND-SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS LL<50		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LL>50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTLY SOILS, ELASTIC SOILS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAY
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

BOULDERS — COARSER THAN 6 INCHES

COBBLES — 3 INCHES TO 6 INCHES

GRAVEL

COARSE — .75 INCHES TO 3 INCHES

FINE — 4.76 MM. TO .75 INCHES

SAND

COARSE — 2.00 MM. TO 4.76 MM.

MEDIUM — .42 MM. TO 2.00 MM.

FINE — .074 MM. TO .42 MM.

SILT — .005 MM. TO .074 MM.

CLAY — FINER THAN .005 MM.

PER ASTM D 2487

HERRON TESTING LABORATORIES, INC.

Consultation and Testing

5405 EAST SCHAAF ROAD • CLEVELAND, OHIO 44131

A P P E N D I X I I

Chemical Analysis/Results and Report

By

Dr. D. Allenson

Chief Chemist

HERRON TESTING LABORATORIES, INC.
CROBAUGH DIVISION
INORGANIC AND ORGANIC ANALYSIS
5405 E. SCHAAF RD.
CLEVELAND, OH 44131
(216) 524-1450

Purchase Order No.
File No. L 8011
April 27, 1979

sis of Groundwater & certain soil samples
d

Harshaw Chemical Company Attn: Mr. Art Longano
113 John Street
Elyria, Ohio
ved on 3-28-79

ANALYSIS

The individual soil samples were inspected visually and by odor for evidence of contamination. The three drill-hole water samples were gone over similarly.

The soil samples having strong organic odor were taken for determination of presence of organic vapors in a range indicating explosive hazard. The soil sample jar was placed in a 120° F. water bath for a period of time and the head space analyzed by an MSA Model 2 Combustible Gas Meter. The meter was calibrated before and during the analyses against a 2.0% methane in air standard, initially showing 45% on the lower explosive limit scale. (A decrease in filament sensitivity was noted during the series of determinations and a new filament was used for the latter measurements). The results follow:

Sample:	B1-2	B1-3	B1-5	B4-1	B4-9
% LEL:	0	0	0	0	0

B5-1	B5-2	B5-7	B5-10	B5-11	B5-12
5	2	0	0	10	0

B5-13	B5-14	B5-15
0	0	0

Water Sample:	B3	B4	B5
	0	5	15

The four samples chosen for partial chemical analysis were the water from drill hole B3, and leachates of the soil samples

271-A

from drill holes B1, B4 and B5 following the explosive gas measurements reported above. Leaching followed the OEPA procedure using proportions of 100 g of soil to 400 ml of liquid leachant. Where sufficient in volume, drill hole water was used as leachant; for B1, deionized water was used.

Following the above analyses, a composite sample was chosen that would contain the highest contaminant levels based on those results. Leachants B4 and B5 were mixed in equal volume to form the composite sample, given extended analysis. The results of analysis are given in two following tables. Analysis followed standard methods (14th Ed.) on EPA procedures, as applicable.

Table 1 Partial Analysis

Sample	LEACHATES			WATER
	B-1	B-4	B-5	B-3
pH	5.8	7.3	7.95	5.95
Conductivity, micromhos/cm	39.3	1950	2940	2840
Total Kjeldahl N	.48	3.76	15.04	9.86
Total Dissolved Solids	144	2524	3000	2286
COD, mg/l	200	400	6000	3000
Oil & Grease	2.4	21	17	14

NOTE: Results are in mg/l or as noted.

Table 2 Extended Analysis of Composite of B-4 and B-5 Leachants

Conductivity	2870 umhos/cm
pH	7.4 pH units
Total Alkalinity	697
Ammonia Nitrogen	1.82
Total Kjeldahl Nitrogen (TKN)	11.14
Nitrate Nitrogen	0.1
Sulfate (SO_4)	318
Chloride (Cl)	449
Total Dissolved solids (TDS)	2654
Calcium (Ca)	194
Magnesium (Mg)	108
Sodium (Na)	252
Iron (Fe)	18
Chemical Oxygen Demand (COD)	4100
Oil & Grease	30
Arsenic	0 .02
Barium	<1
Cadmium	<0.02

Table 2 (con't)

Chromium	0.1
Lead	0.5
Mercury	0.0008
Selenium	0.01
Silver	0.06
Copper	0.1

NOTE: Results are in mg/l or as noted.

In addition to the above analyses, two additional measurements were made to give information on the nature and degree of organic chemical contamination.

(A) The infrared spectrum of the original soil of B5-2 and B5-11 was determined. Reference: Spectrum #2707.

(B) A portion of the composite sample was extracted with carbon disulfide and a gas chromatogram prepared. Reference: gas chromatogram #6300.

Additionally, a determination was made for presence of methane gas in sealed jars containing the remaining amount of drill-hole samples B5-1, -2 and -11, which showed the highest combustible gas readings of the soil samples. The results of gas chromatographic analysis show less than 0.01 percent methane (none detected). See chromatograms, #6297 - 6299.

CONCLUSIONS

1. Combustible organic vapor near the explosive range was found in one soil sample. The other samples were lower, or with undetected amounts of combustible gas. The solvent-type wastes would be expected to decrease in amount over time, and with exposure of the soil during construction. The effects of biological action on such wastes, while not definitly known, are unlikely to form hazardous amounts of methane as formed in decomposition of garbage-type waste, for example. A combustion hazard is considered very unlikely.

2. Corrosion of underground metal piping is a possibility with relatively high dissolved salt concentration, as shown by conductivity and dissolved solids. The high chloride concentration can be considered a corrosion hazard to certain metals. The relative neutrality of all the samples is advantageous with respect to corrosion.

3. Effects on underground cable or other exposure to rubber or plastic materials may be expected from the organic materials.

4. A serious degree of attack on concrete structures would not be expected based on the analytical results.

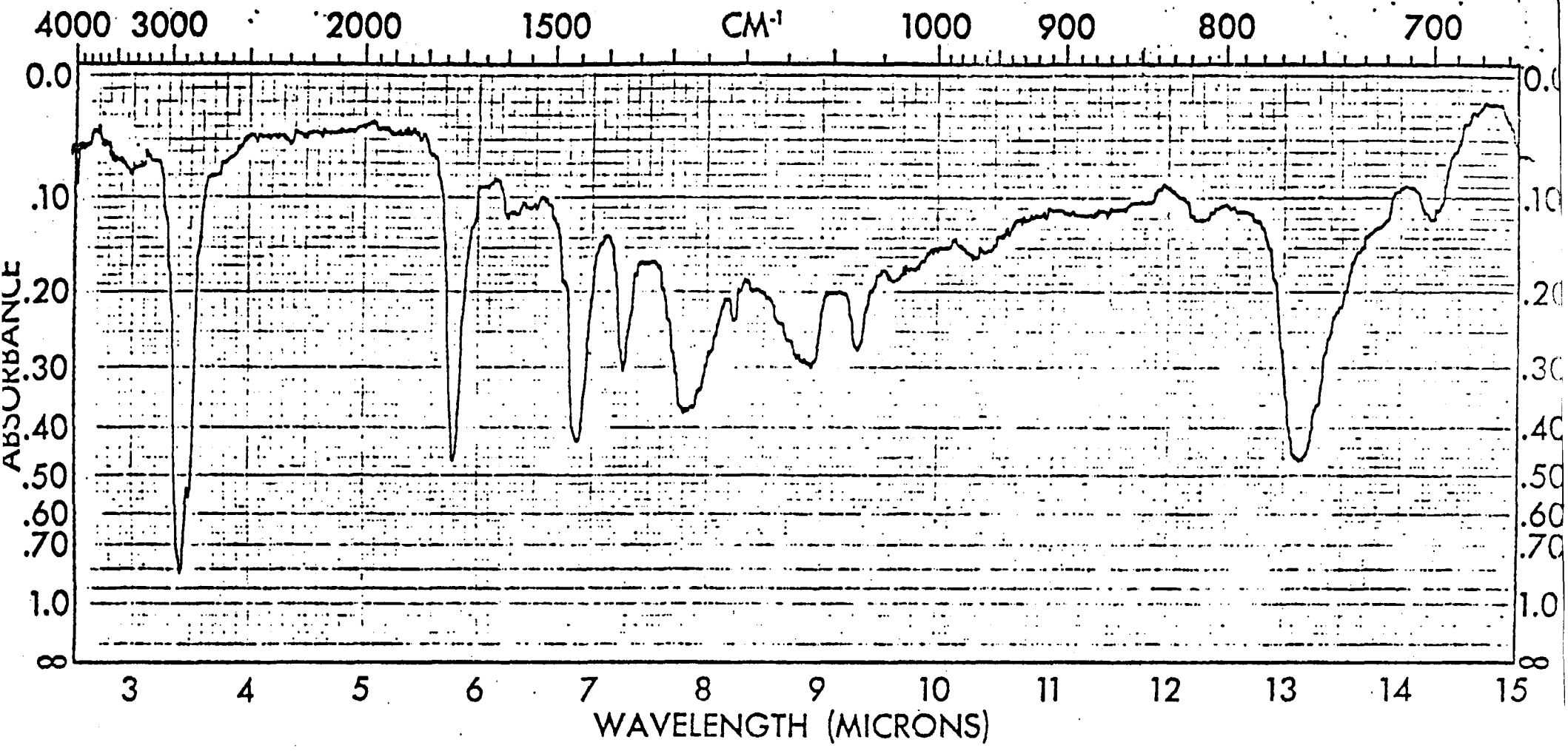
Respectfully submitted,

CROBAUGH DIVISION
HERRON TESTING LABORATORIES, INC.

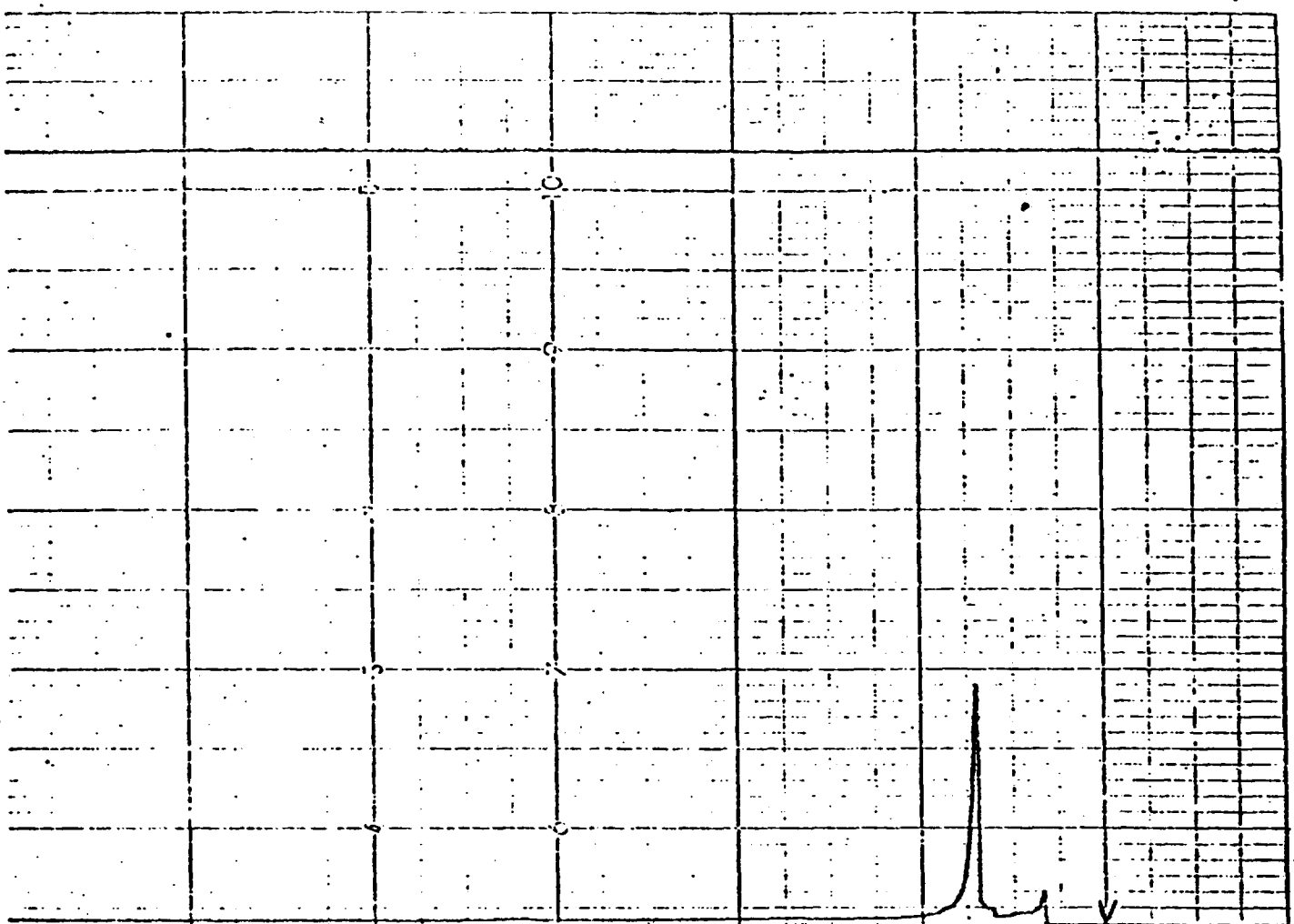
D R Allenson

Douglas R. Allenson, Ph. D.
Chief Chemist

DRA: ljc



SPECTRUM NO. 2707	ORIGIN	LEGEND	REMARKS
SAMPLE L-8011 CHLOROFORM TRANSFER OF FREON EXTRACT OF COMPOSITE #2 & #11 SAMPLES	HARSHAW CHEMICAL CO.	1.	
	PURITY	2.	
	PHASE LIQUID	DATE 4-26-79	
	THICKNESS FILM	OPERATOR CMR	



CROBAUGH LABORATORIES

CHROMATOGRAM # 6300

DATE 27 APR 79 SAMPLE # C-8011 OPERATOR Tom

SAMPLE HARSHAW SIZE .90ml

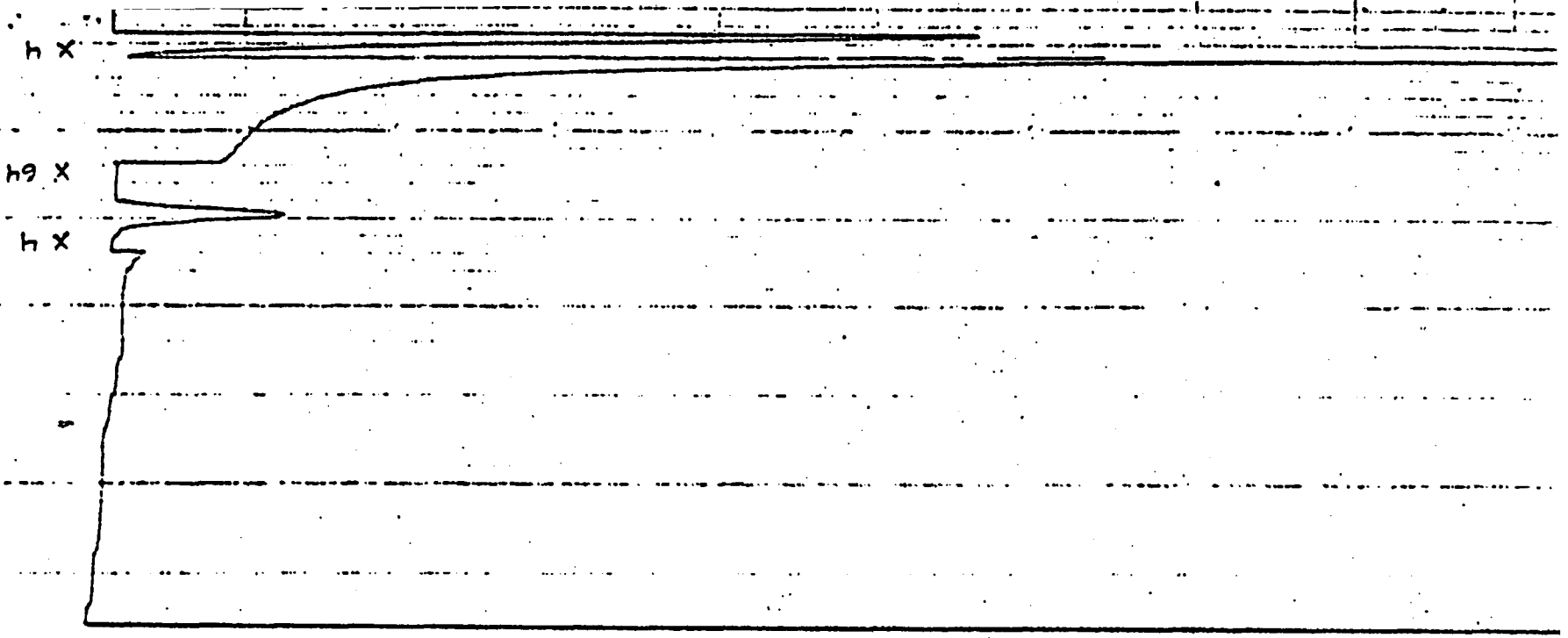
COLUMN 20% SP-2100 LENGTH 6'x 8" FT.

CARRIER GAS 31 ML/MIN. 25 PSI H. 20 ML/MIN. 25 PSI

INJ. PORT 200 °C CLOCK 225 °C COLUMN PROG °C DETECTOR 225 °C

BRIDGE POWER 256 X 10^{-11} A DETECTOR F.I.D.

CHART SPEED 1/3 IN/MIN PROGRAM 3MIN @ 40°C → 250°C @ 10°C/MIN



CROBAUGH LABORATORIES

CHROMATOGRAM # 6298

DATE 25 MAR 79 SAMPLE # L-8011 OPERATOR RM

SAMPLE HARSHAW C SOIL-HOLE #5-22 SIZE 2nd

COLUMN CHROMASORB 102 LENGTH 6'x 4" FT.

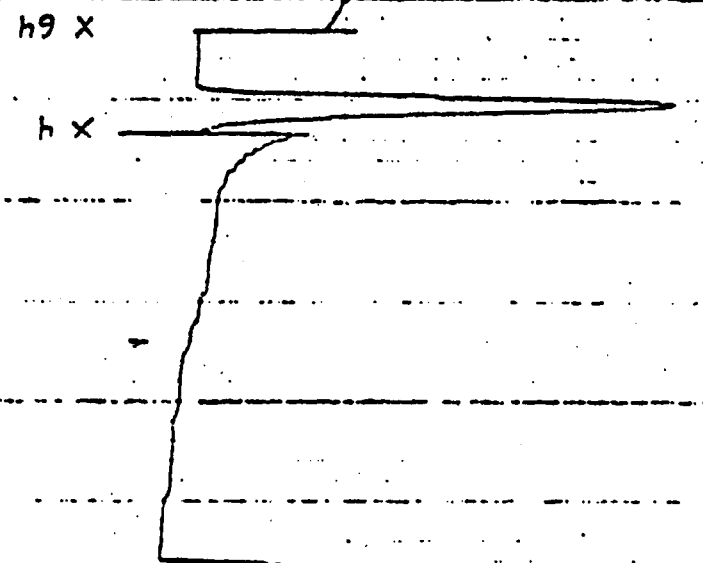
CARRIER GAS N2 ML/MIN. 20 PSI H2 — ML/MIN. — PSI

INJ. PORT 130 °C BLOCK 100 °C COLUMN PROG °C DETECTOR 100 °C

BRIDGE POWER 200 MA DETECTOR T.C.

CHART SPEED ½ IN/MIN. PROGRAM 2 MIN @ 25°C → 150°C

@ 15°C/MIN



CROZAUGH LABORATORIES

CHROMATOGRAM # 6297

DATE 25 APRIL 79 SAMPLE # L-8011 OPERATOR Tom

SAMPLE HARSHAW C. SOIL - HOLE #5 - 12 SIZE 2 mL

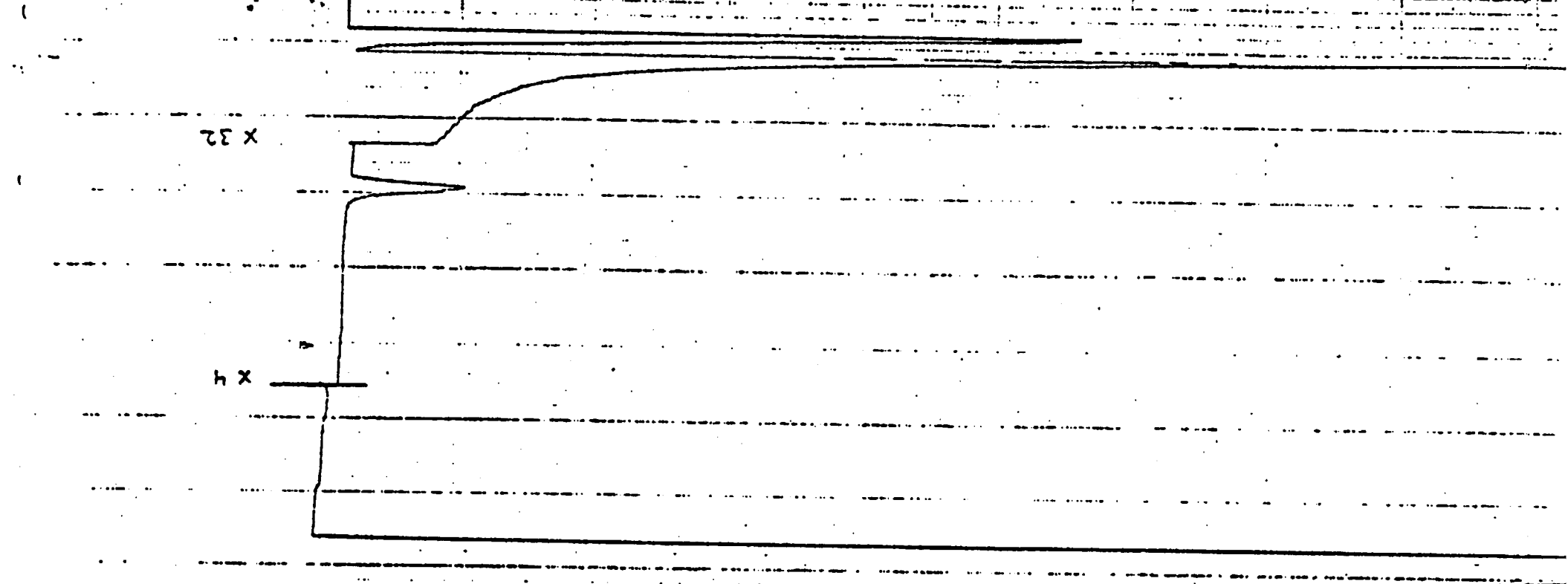
COLUMN CHROMOSORB 102 LENGTH 6' x 1/4" FT.

CARRIER GAS 75 ML/MIN. 20 PSI H$_2$ — ML/MIN. — PSI

INJ. PORT 130 °C BLOCK 100 °C COLUMN PROG. °C DETECTOR 100 °C

BRIDGE POWER 200 MA DETECTOR T.C.

CHART SPEED 1/2 IN/MIN. PROGRAM 2 MIN @ 25°C → 150°C @ 15°C/MIN



CROBAUGH LABORATORIES

CHROMATOGRAM # 6299

DATE 25 APR 79 SAMPLE # L-8011 OPERATOR Tom

SAMPLE HARSHAW (SOIL #5-11) SIZE 2nd

COLUMN 8' CHROMOSORB 102 LENGTH 6' x 1/4" FT.

CARRIER GAS N2 ML/MIN. 20 PSI H_2 — ML/MIN. — PSI

INJ. PORT 130 °C BLOCK 100 °C COLUMN PROG °C DETECTOR 100 °C

BRIDGE POWER 200 MA DETECTOR T.C.

CHART SPEED 1/2 IN./MIN. PROGRAM 2 MIN @ 25°C → 150°C @ 15°C/MIN

OH-293-13

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION
5405 SCHAAF ROAD CLEVELAND, OHIO 44131

December 19, 1979

The Harshaw Chemical Company
113 John Street
Elyria, OH 44035

Attention Mr. Art Longano

SUBJECT: REPORT OF SOIL BORING OPERATIONS
EXISTING AND IN-USE PLANT FACILITIES
CHEMICAL RECOVERY SYSTEMS
LOCUST STREET
ELYRIA, OHIO

HCI Project No. M-9023
Harshaw Chemical Company Purchase Order No. 50131-E

This report summarizes the performance and results of field exploratory operations conducted at the above-referenced location to determine the vertical sequence of the existing subsoil materials and overall groundwater conditions. The investigation was as requested and authorized by Mr. Art Longano of The Harshaw Chemical Company.

A series of ten (10) test holes was drilled on December 4 and 5, 1979, by conventional rotary-drive drilling procedures employing hollow-stem flight augers. The locations and depths of the individual test holes were selected by a representative of The Harshaw Chemical Company and field located by Herron Consultants, Inc. personnel.

The approximate test hole positions are graphically illustrated on the accompanying plot plan.

Representative samples of existing subsoil materials are taken at regular intervals, as shown on the accompanying Test Boring Logs, by means of a two-inch o.d. split-spoon sampling device, driven by a 140-pound hammer, free-falling through a distance of 30 inches. The number of hammer blows required to achieve 18 inches of sample spoon penetration is noted and recorded in individual six-inch increments. The sum of the blow counts associated with the second and third six-inch penetration intervals represents the standard penetration resistance (N).

The samples of materials retained by split-spoon sampling techniques are removed from the sampler, visually classified in the field, and placed in properly-identified sealed glass sample jars for return to our Cleveland soil mechanics laboratory.

All samples obtained during field investigation operations are classified in the Soil Mechanics laboratory following the Unified Soil Classification System and Visual-Manual Procedures. The results of visual-manual classification operations, together with data developed during field exploration operations, are included on the accompanying Test Boring Logs.

Soil samples will be retained for a period of six months and disposed thereof, unless requested to the contrary.

It is recognized that this investigation is limited to field exploratory operations as requested by Mr. Longano and does not include development of physical or structural parameters that may be required to develop recommendations relative to proposed site development. Such services - laboratory test studies and engineering evaluation, if needed, can be furnished upon request.

We wish to thank you for the opportunity to work with you on this project and look forward to continued association in the future.

Should you have any questions, please feel free to contact us.

HERRON CONSULTANTS, INC.

Jack Lader

J.J. Lader, Manager
Drilling Department 447-1335

/j.

Original and 2cc: Mr. Art Longano
The Harshaw Chemical Company

TEST BORING LOGS AND PLOT PLAN

GENERAL NOTES FOR TEST BORING LOGS

ENTERED UNDER **SAMPLE TYPE:**

CA — Continuous Flight Auger Sample
HA — Hand Auger Sample

Disturbed sample obtained from auger flight.

SS — Split Barrel Sample (2" O.D., 1.375" I.D.)*

Driven sampler for disturbed sample.

ST-2 — Thin-Walled Shelby Tube Sample (2" O.D., 1.875" I.D.)
ST-3 — Thin-Walled Shelby Tube Sample (3" O.D., 2.875" I.D.)
PT — Thin-Walled Piston Tube Sample

Static force pressed sampler for "undisturbed" sample.

LS — Sectional Liner Sample (Ring Shear)

W — Wash Sample

Obtained from churn-drive boring methods.

DC — Diamond Rock Core Barrel Sample (unspecified size)
NX — 2.125" I.D. Diamond Rock Core Barrel Sample
BX — 1.625" I.D. Diamond Rock Core Barrel Sample
AX — 1.1875" I.D. Diamond Rock Core Barrel Sample

ENTERED UNDER **SAMPLE NO.:**

[2] — Indicates sample number and acquisition interval.

ENTERED UNDER **BLOW COUNT:**

EXAMPLE: 6/9/12 — The number of blows of a 140-pound hammer, free falling through a distance of 30 inches, required to drive a standard (2" O.D., 1.375" I.D.) split barrel sampler into the soil, including an initial six-inch seating penetration. Blows recorded in 6-inch increments for a distance of 18 inches.

EXAMPLE: 60/2" — The number of blows (60) required to drive a standard split barrel sampler for a distance (2") of less than one foot.

SSR — Split barrel sampler penetration refusal at advance of less than one inch for 50 blows.

AR — Auger refusal.

(*) Other diameters, when employed, are noted on Boring Log.

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SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			GROUP SYMBOL	GRAPHIC SYMBOL	TYPICAL NAME
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS	GW		WELL GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP		POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND	SW		WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SAND WITH FINES	SM		SILTY SANDS, SAND-SILT MIXTURES
			SC		CLAYEY SANDS, SAND-SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS LL<50		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LL>50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTLY SOILS, ELASTIC SOILS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAY
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

BOULDERS — COARSER THAN 6 INCHES

COBBLES — 3 INCHES TO 6 INCHES

GRAVEL

COARSE — .75 INCHES TO 3 INCHES

FINE — 4.76 MM. TO .75 INCHES

SAND

COARSE — 2.00 MM. TO 4.76 MM.

MEDIUM — .42 MM. TO 2.00 MM.

FINE — .074 MM. TO .42 MM.

SILT — .005 MM. TO .074 MM.

CLAY — FINER THAN .005 MM.

PER ASTM D 2487

HERRON CONSULTANTS, INC.

ENGINEERING • TESTING • INSPECTION

Harshaw Chemical Company
Project 7911

Analytical Results

environmental consulting services inc.
11001 cedar avenue cleveland ohio 44106
216 229 9760

Oil and Grease

Sample #	Medium	Concentration (mg/l)	Date analyzed
E307-11-12-9	water	34.3	12/7/79
E307-11-12-11	water	0.8	"
E307-11-12-12	water	74.0	"
E307-11-12-13	water	10.5	"
E307-11-12-14	water	13.0	"
E307-11-12-15	water	20.6	"
E307-11-12-16	water	12.3	"
E307-11-12-10	sediment	0.63 g/kg dry weight 25.3% moisture in sediment	"

Chemical Oxygen Demand (COD)

E307-11-12-9	water	262	12/7/79
E307-11-12-11	water	34	"
E307-11-12-12	water	101	"
E307-11-12-13	water	42	"
E307-11-12-14	water	47	"
E307-11-12-15	water	161	"
E307-11-12-16	water	51	"
E307-11-12-10	sediment	*37 g/kg dry weight 24.5% moisture in sediment	"

* average of three samples

APPENDIX A

RIVER SAMPLES - IDENTIFICATION

E-307-11-12-9	Oil and grease sample skimmed from water in dike behind Chemical Recovery Systems.
E-307-11-12-10	Dirt from below storm sewer outlet. (1)
E-307-11-12-11	Midstream opposite storm sewer outlet.
E-307-11-12-12	Within flotation collar approximately 40 ft. upstream from storm sewer outlet. (No deliberate intent to select organic skimmings, as in the case of sample No. E-307-11-12-9.)
E-307-11-12-13	Midstream below Washington Avenue bridge (downstream from Chemical Recovery Systems).
E-307-11-12-14	Midstream below East Bridge Street bridge (upstream from Harshaw - downstream from falls).
E-307-11-12-15	City outfall across river from Zirconium Department (City storm sewer outlet).
E-307-11-12-16	Midstream in back of Alumina Gel Department in line with silos (downstream from City storm sewer outlet).

(1) Until 1977, this was a combination sewer for the whole peninsula. Harshaw installed sanitary sewer in 1977. The above sewer is now storm sewer only.

NOTE: Samples taken December 6, 1979.

Harshaw Chemical Company
Project 7911

services inc.

PRIORITY POLLUTANTS-Base/neutral extractable organics

SAMPLE # (E307-11-12-)	9	10	12	15	
1,2-Dichlorobenzene					
1,3-Dichlorobenzene					
1,4-Dichlorobenzene					
Hexachloroethane	/				
Hexachlorobutadiene					
Hexachlorobenzene					
1,2,4-Trichlorobenzene					
bis(2-Chloroethoxy)methane					
Naphthalene	+	+	+	+	
2-Chloronaphthalene					
Isophorone					
Nitrobenzene					
2,4-Dinitrotoluene					
2,6-Dinitrotoluene					
4-Bromophenyl phenyl ether					
bis(2-Chloroisopropyl) ether					
bis(2-Ethylhexyl) phthalate	++	+	+	+	
Di-n-octyl phthalate	+	+	+		
Dimethyl phthalate	++	X		X	
Diethyl phthalate	+		+	X	
Di-n-butyl phthalate	+	+	+	+	
Butyl benzyl phthalate	X	+	trace	+	
4-Chlorophenyl phenyl ether					
bis(2-Chloroethyl) ether					
N-Nitrosodiphenylamine					
N-Nitrosodimethylamine					
N-Nitrosodi-n-propylamine					

\+ present
++ present in high concentration
X present in low concentration
/ presence highly probable

Project 7911

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services inc.
[illegible] 216 279 9760

Base/neutral extractable organics (contd.)

SAMPLE # (E307-11-12-)	9	10	12	15	
Acenaphthylene	+	+		+	
Acenaphthene	+	+		+	
Fluorene	+	+		X	
Fluoranthene	/	+	+	+	
Chrysene	+	+	+	+	
Pyrene	/	+	+	+	
Phenanthrene	* +	* /	* +	* +	
Anthracene	* +	* /	* +	* +	
Benzo(a)anthracene					
Benzo(b)fluoranthene	/				
Benzo(k)fluoranthene	+	+	+	+	
Benzo(a)pyrene	+		+	+	
Indeno(1,2,3-c,d)pyrene	+			+	
Dibenzo(a,h)anthracene					
Benzo(g,h,i)perylene	+			+	
3,3'-Dichlorobenzidine					
Benzidine					
1,2-Diphenylhydrazine					
Hexachlorocyclopentadiene					

\+ present
++ present in high concentration
X present in low concentration
/ presence highly probable
* one or both phenanthrene and anthracene are present (peaks are indeterminant in separation)

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Project 7911

environmental consulting services inc.

January, 1980

PRIORITY POLLUTANTS-Acid extractable organics

SAMPLE # (E307-11-12-)	9	10	12	15	
Phenol	+		+	+	
2-Nitrophenol					
4-Nitrophenol					
2,4-Dinitrophenol					
4,6-Dinitro-o-cresol					
Pentachlorophenol					
p-Chloro-m-cresol					
2-Chlorophenol	/	/	+		
2,4-Dichlorophenol					
2,4,6-Trichlorophenol					
2,4-Dimethylphenol					

\+ present

/ presence highly probable

Harshaw Chemical Company
Project 7911

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[illegible] cedar avenue cleveland ohio 44106
216 229 9760

January [illegible]

PRIORITY POLLUTANTS-Pesticides/PCB's

SAMPLE # (E307-11-12-)	9	10	12	15
α-Endosulfan				
β-Endosulfan				
Endosulfan sulfate				
α-BHC		* /	* +	
β-BHC		* /	* +	
δ-BHC		* /	* +	
γ-BHC		* /	* +	
Aldrin				
Dieldrin				
4,4'-DDE				
4,4'-DDD			+	
4,4'-DDT				
Endrin				
Endrin aldehyde				
Heptachlor		trace		
Heptachlor epoxide				
Chlordane			+	/
Toxaphene				
Aroclor 1016				
Aroclor 1221				
Aroclor 1232				
Aroclor 1242				
Aroclor 1248				
Aroclor 1254				
Aroclor 1260				
2,3,7,8-Tetrachlorodizenzo-p-dioxin (TCDD)				

+ present

/ presence highly probable

* forms of BHC were not separable in this analysis

NOTE: No pesticides or PCB's were detected in sample 9. All compounds detected were in low concentrations.

Harshaw Chemical Company
project 7911

environmental consulting services inc.

January, 1980

PRIORITY POLLUTANTS-Purgeable organics

SAMPLE # (E307-1 12-)	9*	10	12	15
Acrolein				
Acrylonitrile				
Benzene		+		
Toluene				+
Ethylbenzene			+	+
Carbon tetrachloride				
Chlorobenzene				
1,2-Dichloroethane				
1,1,1-Trichloroethane		+		
1,1-Dichloroethane		+		
1,1-Dichloroethylene		+		
1,1,2-Trichloroethane				
1,1,2,2-Tetrachloroethane				
Chloroethane				
2-Chloroethyl vinyl ether				
Chloroform				
1,2-Dichloropropane				
1,3-Dichloropropene				
Methylene chloride		+	+	
Methyl chloride				
Methyl bromide				
Bromoform				
Dichlorobromomethane				
Trichlorofluoromethane				
Dichlorodifluoromethane				
Chlorodibromomethane				
Tetrachloroethylene				
Trichloroethylene			+	+
Vinyl chloride				
1,2-trans-Dichloroethylene			+	
bis(Chloromethyl) ether				

\+ present

* sample not run

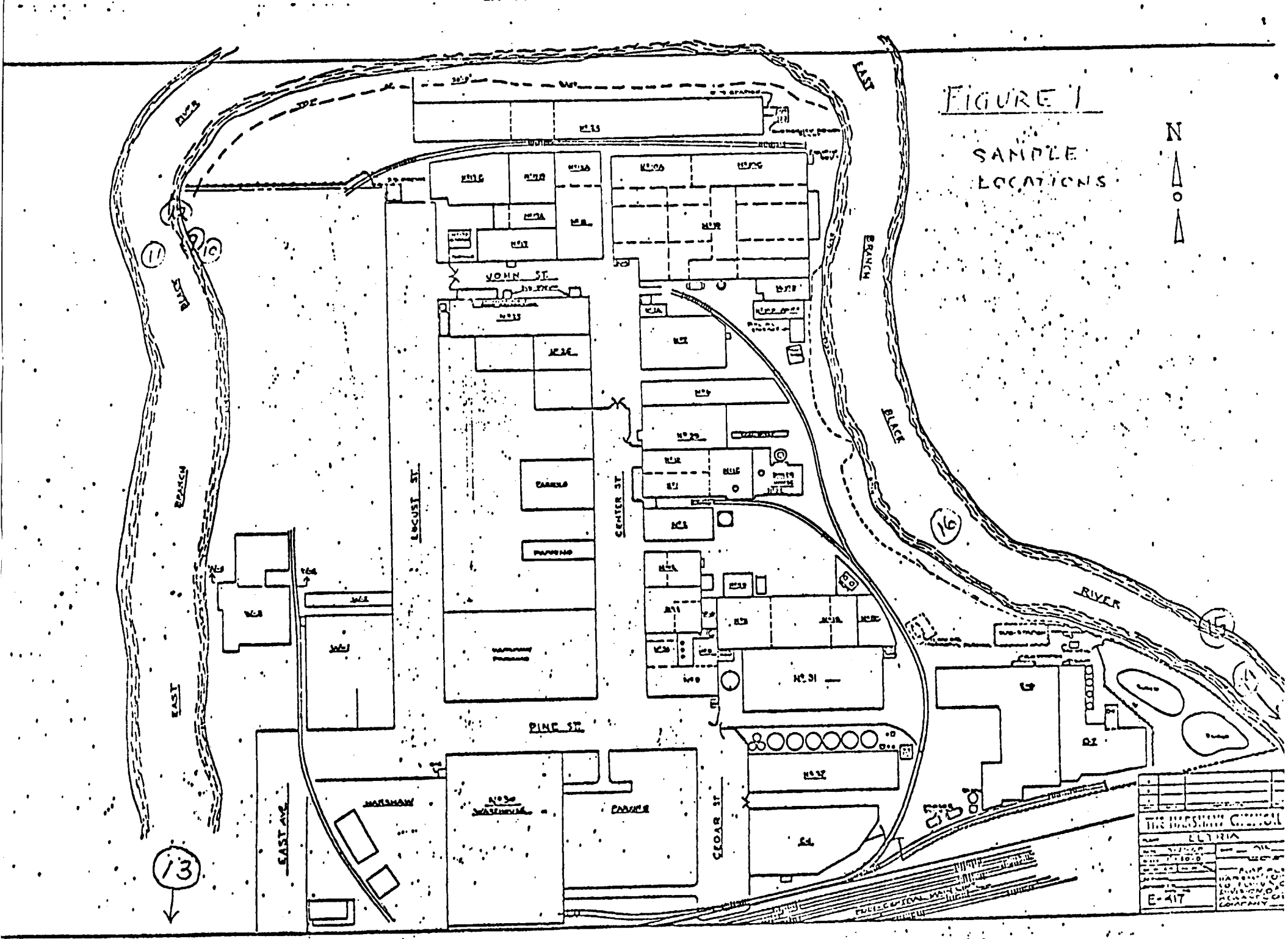
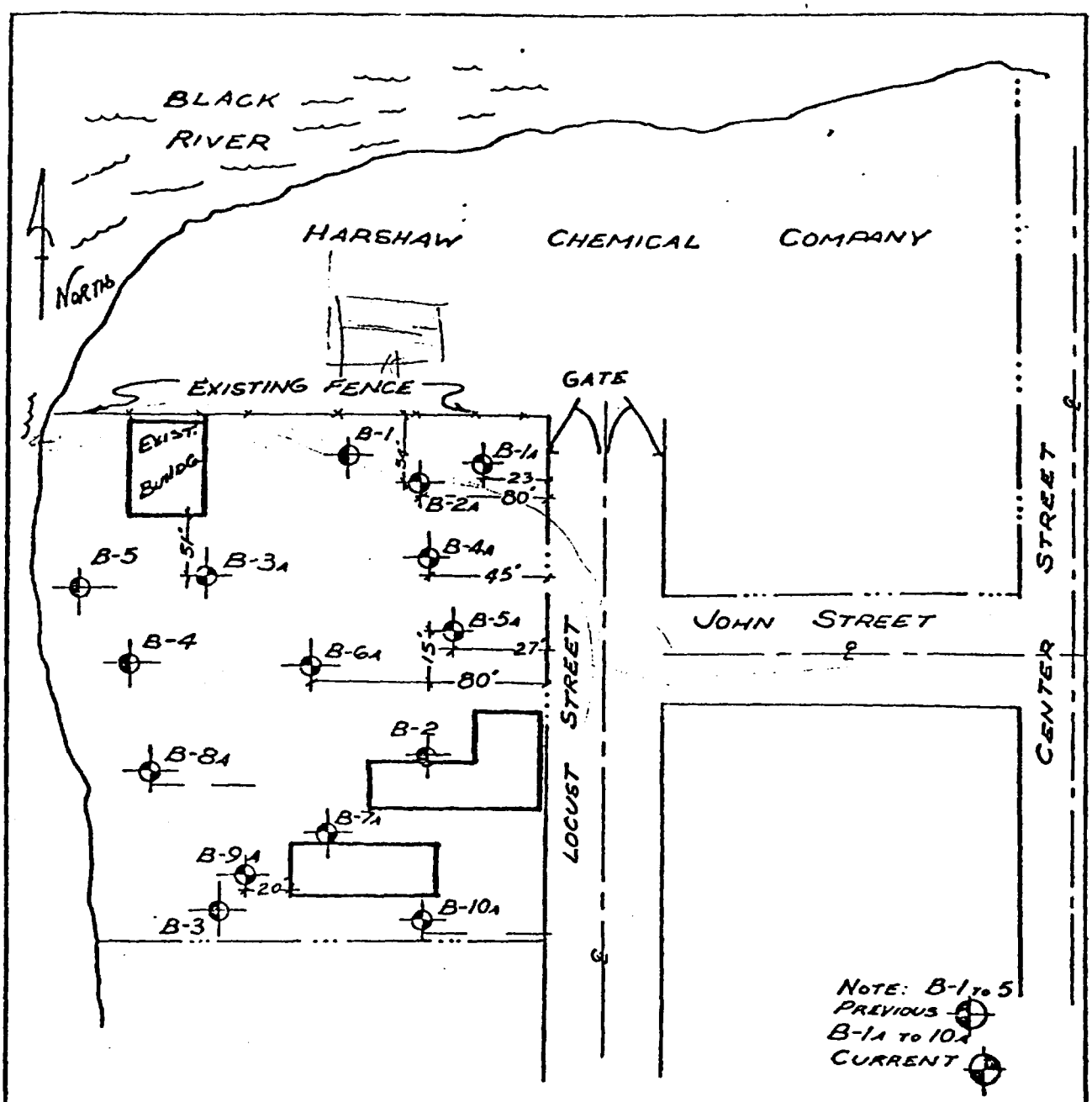


FIGURE 1
SAMPLE LOCATIONS
N
EAST BRANCH
BLACK RIVER
JOHN ST.
LOCUST ST.
CENTER ST.
PINE ST.
CEDAR ST.
EAST AVE.
MARSHAW
PARKING
RIVER
E-417



BORING LOCATION PLAN

FOR: THE HARSHAW CHEMICAL COMPANY

AT: EXISTING IN-USE PLANT FACILITY
CHEMICAL RECOVERY SYSTEMS, INC.
LOCUST STREET
ELYRIA, OHIO

REVISIONS		CHECKED	SCALE	PROJECT NUMBER
DATE	REMARK		1" = 100'±	M-9023
4-9-79	SD-516		DRAWN	
12-11-79	SD-555 Revised	APPROVED		DRAWING NUMBER
			DATE 12-11-79	SD-555

HERRON TESTING LABORATORIES, INC.
Consultation and Testing
5405 EAST SCHAAF ROAD-CLEVELAND, OHIO 44131

TEST BORING LOG

TEST HOLE B-1A

FILE NO.: M-9023

PROJECT: EXISTING AND IN-USE PLANT FACILITIES
CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 4, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	8-7-3	Brown FINE SAND with Black Cinders. Some Silt. Medium. Moist. (SM)
			2	SS	4-8-50/3"	
			3	SS	82/6"	Light Brown Sandstone. Moist.
	5					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION: NONE
AFTER FROZEN AT 0 to 0.5'
TERMINAL DEPTH: 3.8'

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 4, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	10-7-5	Black Cinders. Some Sand and Brick Fragments. Strong Petroleum Odor. Fill. Moist.
			2	SS	5-2-2	
			3	SS	32-50	
	5		4	SS	75/5"	Light Brown Sand and Sandstone Layers. Some Silt. Moist.
	10					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION: NONE
AFTER FROZEN AT 0 to 0.5'
TERMINAL DEPTH: 5.4'

HERRON CONSULTANTS INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

TEST HOLE

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: DRILLED: DECEMBER 4, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	10-6-8	Dark Brown SILTY SAND and Cinders. Some Brick Fragments. Fill. Medium to Loose. Moist. (SM)
			2	SS	2-3-4	
			3	SS	3-21-13	Brown Fine Sand and Sandstone layers. Some Silt. Dense to Very Dense. Moist.
	5		4	SS	32-75/5"	
	10					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION:
AFTER AT
TERMINAL DEPTH: 5.9'

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

TEST HOLE B-4A

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: DRILLED: DECEMBER 4, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	4-6-5	Black Fine Cinders. Some Sand, Slag and Silt. Fill. Moist.
			2	SS	4-2-5	Brown FINE SAND. Some Silt. Trace Slag. Fill. Loose. Moist. (SM)
			3	SS	48-65	Brown Fine Sand with Sandstone Fragments. Moist.
	5					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION: NONE
AFTER FROZEN AT 0 to 0.5'
TERMINAL DEPTH: 4.5'

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 4, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	6-10-5	Dark Brown SILTY SAND to Brown FINE SAND with Some Silt. Some Cinders. Trace Gravel. Fill. Medium.
			2	SS	6-5-9	Moist. (SM)
			3	SS	52/3"	Brown Sandstone. Some Silty Clay, Sandy, and Silty Sand Layers. Moist.
	5					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION: NONE
AFTER FROZEN AT 0 to 0.5'
TERMINAL DEPTH: 3.8'

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

TEST HOLE

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 4, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	5-6-4	Dark Brown SILTY FINE SAND. Some Cinders and Sandstone Fragments. Medium. Moist. (SM)
			2	SS	3-3-11	Brown FINE SAND. Some Silt to Silty. Some Sandstone Fragments. Medium. Moist. (SP-SM)
			3	SS	9-11-13	
	5		4	SS	11-60/2"	Brown Silty Sand and Sandstone Fragments. Moist.
	10					

GROUNDWATER:

ENCOUNTER: NONE

AT COMPLETION: NONE

AFTER FROZEN AT 0 to 0.5'

TERMINAL DEPTH: 5.7'

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 5, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	12-10-10	Black Cinders. Some Silty Sand, Sandstone Fragments, and Brick Fragments. Fill. Medium. Moist.
			2	SS	5-4-9	
			3	SS	4-3-3	Brown Silty Sand and Sandstone Layers. Loose to Very Dense. Moist.
	5		4	SS	4-8-12	
			5	SS	16-22-22	
			6	SS	73/4"	
	10					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION: NONE
AFTER _____ AT _____
TERMINAL DEPTH: 8.3'

HERRON CONSULTANTS, INC.
ENGINEERING · TESTING · INSPECTION

TEST BORING LOG

TEST HOLE

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 5, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	6-4-4	Black Cinders and Silty Fine Sand. Some Sandstone Fragments. Fill. Loose to Medium. Moist.
			2	SS	5-4-5	
			3	SS	5-4-6	
	5		4	SS	6-9-12	Brown Sand and Sandstone Layers. Medium to Very Dense. Moist.
			5	SS	7-32-64	
	10					

GROUNDWATER: ENCOUNTER: NONE

AT COMPLETION: NONE

AFTER _____ AT _____

TERMINAL DEPTH: 8.0'

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

TEST HOLE

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 5, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	16-12-10	Black Cinders and Dark Brown Sand. Some Silt, Gravel and Sandstone Fragments. Fill. Medium. Moist.
			2	SS	6-8-8	
			3	SS	5-3-6	Brown SILTY SAND. Some Sandstone Fragments. Fill. Loose. Moist. (SM)
	5		4	SS	12-16-53	Brown Sandstone and Brown Sand. Moist.
	10					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION: NONE
AFTER _____ AT _____
TERMINAL DEPTH: 6.5'

HERRON CONSULTANTS, INC.
ENGINEERING • TESTING • INSPECTION

TEST BORING LOG

TEST HOLE _____

EXISTING AND IN-USE PLANT FACILITIES

FILE NO.: M-9023

PROJECT: CHEMICAL RECOVERY SYSTEMS - LOCUST STREET - ELYRIA, OHIO

FOR: THE HARSHAW CHEMICAL COMPANY - ELYRIA, OHIO

ELEV. DATUM: _____ DRILLED: DECEMBER 5, 1979 BY M. HIMMEL

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION
	0		1	SS	27-5-8	Black Cinders. Some Sand and Silt. Fill. Moist.
			2	SS	6-8-9	Brown and Dark Brown SILTY SAND. Some Cinders and Sandstone Fragments. Medium. Moist. (SM)
			3	SS	12-17-36	Light Brown Sandstone. Moist.
	5		4	SS	60/6"	
	10					

GROUNDWATER:
ENCOUNTER: NONE
AT COMPLETION: NONE
AFTER _____ AT _____
TERMINAL DEPTH: 5.5'

HERRON CONSULTANTS, INC.
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